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COUNTRY USSR

SUBJECT Analysis of Soviet Engine Mount

DATE OF INFORMATION 4 February 1952

1. The engine mount assembly consisted of the following:

- a. One 20-inch length of 1.36-inch O.D. tubing, with 0.053-inch-thick wall.
- b. One 20-inch length of 0.98-inch O.D. tubing, with 0.059-inch-thick wall.
- c. Clevis.
- d. Bolt - 0.55-inch diameter by 3 inches long, hexagonal head.
- e. Hexagonal nut for the bolt described in Item d.

The tubing and clevis were painted with a gray-green paint. The bolt and nut were cadmium plated. The two lengths of tubing were welded together at an angle of about 30 degrees and both, in turn, were welded to the clevis. Welding was done by the metal-arc process and was of good quality by U. S. standards.

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2.

3. Spectrographic and Chemical Analyses:

- a. Spectrographic and chemical analyses indicated that parts (a) thru (c) above were generally in accordance with Soviet specification 30 x 1 CA.

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The specification for this type of steel is:

Steel Type:	C	Mn	Si	Cr	Ni	S	P
30x 7 ca	0.28-0.35	0.8-1.1	0.09-1.1	0.8-1.1	0.3	0.04	0.04

Part (d) was made from a plain 0.50 per cent carbon steel corresponding to AISI specification C 1050 (USSR Spec. 50)

4. The microstructure of the parts was as follows:

- a. The tubing and clevis had microstructures consisting of tempered martensite. These parts were quenched and tempered before welding.
- b. The bolt contained spheroids of carbides and small islands of ferrite, with the major portion of the structure being tempered martensite. The presence of the carbide spheroids and the ferrite indicates that the austenitizing temperature and/or time used in heat treating the bolt were inadequate to convert the structure completely to austenite before quenching. The temperature may have been too low or the time in the furnace insufficient for the bolt to reach the desired temperature.
- c. The microstructure of the nut consisted of fine pearlite and some ferrite, which is typical of normalized plain-carbon containing 0.5 per cent carbon.

5. The results of tests to determine tensile and hardness characteristics were as follows:

TENSILE PROPERTIES AND HARDNESS

Description	Yield Strength, 0.2% Offset, p.s.i.	Ultimate Strength, p.s.i.	Elongation, Per Cent in 2 in.	Hardness, Rockwell C
Tubing, 1.36" O.D.	121,000 124,000	132,500 136,000	10.0 10.0	27
Tubing, 0.98" O.D.	140,000 137,000	150,000 149,000	10.0 11.0	28
Clevis	---	--	--	32
Bolt	88,500	120,000	20.0*	27.
Nut	--	--	--	25
	105,000-130,000	127,000-140,000	18-22	28

6. This chromium-manganese-silicon steel has been investigated in the United States in the 1930's but has not found popularity here. The Soviets use the steel extensively in their airframes. The MIG-15 engine mount stabilizer spar, linkages, brackets, and other structural parts are made of this steel; the steel has also been used in the landing gear strut of the YAK-9.

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